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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/944,284	08/31/2001	Jon A. Casey	FIS920010127US1 (IFI-10-5)	1893
29037	7590	04/26/2004	EXAMINER HARAN, JOHN T	
DRIGGS, LUCAS, BRUBAKER & HOGG CO. L. P. A. DEPT IFI 8522 EAST AVENUE MENTOR, OH 44060			ART UNIT 1733	PAPER NUMBER

DATE MAILED: 04/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/944,284

Applicant(s)

CASEY ET AL.

Examiner

John T. Haran

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Finality is withdrawn and all previous rejections are withdrawn in light of the Appeal Brief filed on 3/8/04.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-9 are rejected under 35 U.S.C. 103(a) as being obvious over Curcio et al (U.S. Patent 6,465,084) in view of Pommer (U.S. Patent 6,560,844) or Kariya (WO 01/42006).

The applied reference (U.S. Patent 6,465,084) has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the

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application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). For applications filed on or after November 29, 1999, this rejection might also be overcome by showing that the subject matter of the reference and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person. See MPEP § 706.02(I)(1) and § 706.02(I)(2).

Curcio et al teaches a method of forming a laminated composite printed wiring structure of a plurality of at least three superimposed subcomposites wherein a plurality of at least three organic dielectric subcomposite structures, each having a plurality of through via openings and each having printed wiring on at least one face, are provided; each via opening is filled with a conductive paste material that can be cured and the paste material extends beyond the openings of the subcomposite structure; the subcomposites are stacked with adhesive layers between the subcomposites with holes provided therein for the conductive paste so that the vias of adjacent subcomposites are aligned and the conductive paste extending from the vias contact with each other; and then the conductive paste is fully cured to form a laminated structure (Column 2, lines 40-67; Column 3, line 47 to Column 4, line 8; Figures 7-8).

Curcio et al is silent towards providing a plurality of aligned index openings in each subcomposite which cooperate with a fixture to align the via holes in adjacent subcomponent structures when in superimposed relationship. However, it is well known and conventional in art when forming multilayered articles that need proper alignment of the layers to have index openings in each sheet and to lay the sheets on a fixture

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through the index openings so that the stack is properly aligned, as shown for example in Pommer (Column 1, lines 10-17; Figure 1) and Kariya (relying on English version U.S. Patent 6,440,542 Column 8, lines 34-43). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use conventional means to ensure proper alignment and registration of the stacked subcomposites by providing index openings in each subcomposite to cooperate with a fixture (guiding pin) as suggested by Pommer or Kariya in the method of Curcio et al.

Regarding claim 2, Curcio teaches the adhesive material is in the form of separate adhesive sheets (See Figure 7).

Regarding claims 3-5, Curcio teaches that the vias can be plated with metal or that the metal plating can be omitted (Column 2, lines 40-49). Curcio is silent towards the metal plating being copper, but such is a conventional metal to using for via plating and it would have been obvious to use in the method of Curcio et al.

Regarding claim 6, Curcio teaches partially curing the conductive paste before laminating the subcomposites (Column 2, lines 64-67).

Regarding claims 7-9, Curcio teaches filling the vias by screening (using a mask), one would expect the mask to be registered and aligned with the via holes, and it is conventional to also use the mask to apply circuitry to the subcomposite and it would have been obvious to do so.

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4. Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kariya (WO 01/42006) in view of Bross et al (U.S. Patent 5,517,751).

It is noted that the English version of Kariya (U.S. Patent 6,440,542) is relied upon and referred to for the teachings of Kariya.

Kariya teaches a method for forming a laminated composite printed circuit board with a plurality of at least three superimposed subcomposites wherein a plurality of at least three organic dielectric subcomposite structures, each having a plurality of through via openings and each having printed wiring on at least one face, are provided; each via opening is filled with a conductive paste material that can be cured and the paste material extends beyond the openings of the subcomposite structure; the subcomposites are stacked with adhesive layers between the subcomposites with holes provided therein for the conductive paste so that the vias of adjacent subcomposites are aligned and the conductive paste extending from the vias contact with each other; each subcomposite structure has aligned guide holes that cooperate with guiding pins to properly align the subcomposite structures during the stacking; and then the conductive paste is fully cured to form a laminated structure (Column 7, line 55 to Column 9, line 9; Figures 3-4).

Kariya teaches that at least two adjacent subcomposites have extending conductive paste structures that contact each other during the stacking step and fuse together in the curing step to form an interconnect, but is silent towards forming an interconnect between aligned vias in three adjacent subcomposite structures with contacting conductive paste structures. First it is noted that the configuration depicted

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in the Figures is merely exemplary and one skilled in the art would have readily appreciated that configuration of interconnects vary depending upon the ultimate use of the printed circuit board. Furthermore, it is well known and conventional for interconnect structures to be formed from the vias of three aligned subcomposite structures with extending conductive structures that are in contact and fuse together to form an interconnect, as shown for example in Bross et al (See Figures 3-4). It would have been obvious to one of ordinary skill in the art at the time the invention was made to form an interconnect from the aligned filled vias of at least three adjacent subcomposite structure with the conductive paste structures contacting each other and fusing together during curing in the method of Kariya as suggested in Bross et al.

Regarding claim 2, Kariya teaches providing separate adhesive sheets (Column 8, line 67 to Column 9, line 2).

Regarding claims 3 and 5, Kariya is silent towards copper plating the vias, however such is notoriously well known and conventional in the art and it would have been obvious to do so.

Regarding claim 4, Kariya teaches the via openings are free of plating (See Figures).

Regarding claim 6, Kariya is silent towards partially curing the conductive paste prior to lamination, but such is well known and conventional in the art and would have been obvious.

Regarding claims 7-9, Kariya teaches the via openings are filled with the conductive paste through a mask (Column 8, lines 16-21), one would expect the mask

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to be registered and aligned with the via holes, and it is conventional to also use the mask to apply circuitry to the subcomposite and it would have been obvious to do so.

5. Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over St. John (U.S. Patent 6,337,037) in view of Bross et al (U.S. Patent 5,517,751) and either Pommer (U.S. Patent 6,560,844) or Kariya (WO 01/42006).

St. John teaches a method of forming a laminated composite printed wiring structure of a plurality of at least three superimposed subcomposites wherein a plurality of at least three organic dielectric subcomposite structures, each having a plurality of through via openings and each having printed wiring on at least one face, are provided; each via opening is filled with a conductive paste material that can be cured and the paste material extends beyond the openings of the subcomposite structure; the subcomposites are stacked so that the vias of adjacent subcomposites are aligned and the conductive paste extending from the vias contact with each other; and then the conductive paste is fully cured to form a laminated structure (Column 7, line 40 to Column 8, line 6).

St. John teaches that at least two adjacent subcomposites have extending conductive paste structures that contact each other during the stacking step and fuse together in the curing step to form an interconnect (See Figure 1), but is silent towards forming an interconnect between aligned vias in three adjacent subcomposite structures with contacting conductive paste structures. First it is noted that the configuration depicted in the Figures is merely exemplary and one skilled in the art would have readily

appreciated that configuration of interconnects vary depending upon the ultimate use of the printed circuit board. Furthermore, it is well known and conventional for interconnect structures to be formed from the vias of three aligned subcomposite structures with extending conductive structures that are in contact and fuse together to form an interconnect, as shown for example in Bross et al (See Figures 3-4). It would have been obvious to one of ordinary skill in the art at the time the invention was made to form an interconnect from the aligned filled vias of at least three adjacent subcomposite structure with the conductive paste structures contacting each other and fusing together during curing in the method of St. John as suggested in Bross et al.

St. John also teaches that an adhesive layer is formed between the subcomposites when the adhesive extending beyond the via spreads between the subcomposites during lamination, however one skilled in the art would have readily appreciated that such might not be sufficient and would be motivated to use the well known and conventional technique of applying adhesive layers with openings for the extending conductive pastes as shown for example in Kariya (relying on English version U.S. Patent 6,440,542 Column 8, line 64, to Column 9, line 2) or Bross et al (Column 3, lines 48-53). It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply a separate adhesive layer with holes for the conductive pastes between the subcomposites in order to ensure adequate adhesion in the method of St. John, as suggested in Kariya or Bross et al.

St. John is also silent towards providing a plurality of aligned index openings in each subcomposite which cooperate with a fixture to align the via holes in adjacent

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subcomponent structures when in superimposed relationship. However, it is well known and conventional in art when forming multilayered articles that need proper alignment of the layers to have index openings in each sheet and to lay the sheets on a fixture through the index openings so that the stack is properly aligned, as shown for example in Pommer (Column 1, lines 10-17; Figure 1) and Kariya (relying on English version U.S. Patent 6,440,542 Column 8, lines 34-43). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use conventional means to ensure proper alignment and registration of the stacked subcomposites by providing index openings in each subcomposite to cooperate with a fixture (guiding pin) as suggested by Pommer or Kariya in the method of St. John.

Regarding claim 2, as noted above, St. John relies upon the adhesive from the extending portion to spread and form an adhesive layer, however one skilled in the art would have readily appreciated that such might not be sufficient and would be motivated to use the well known and conventional technique of applying separate adhesive sheets between the subcomposites, as shown for example in Kariya (Column 8, line 64, to Column 9, line 2). It would have been obvious to do so in the method of St. John, as modified above.

Regarding claims 3-5, St. John teaches both plating the via holes with copper and not plating the via holes (Column 6, lines 41-63).

Regarding claim 6, St. John teaches partially curing the conductive paste before laminating (Column 7, lines 55-57).

Regarding claims 7-9, St. John is silent towards using an aligned mask to fill the vias and form the circuitry, however such is notoriously well known and conventional and it would have been obvious to do so in the method of St. John, as modified above.

Response to Arguments

6. Applicant's arguments with respect to claims 1-9 have been considered but are moot in view of the new ground(s) of rejection.

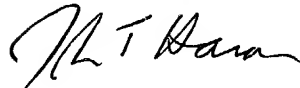
Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **John T. Haran** whose telephone number is **(571) 272-1217**. The examiner can normally be reached on M-Th (8 - 5) and alternate Fridays.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Crispino can be reached on (571) 272-1226. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



John T. Haran



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